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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Kesahiro Koike

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SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER

VINH, LAN

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/809,523	Applicant(s) KOIKE, KESAHIRO	
	Examiner LAN VINH	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 6-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,6-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. The Applicants argue that Takeuchi et al does not disclose "the local machining carried out by a gas cluster ion beam or by MRF (Magnetorheological Finishing)."/ Takeuchi et al does not disclose polishing the surface of the glass substrate subjected to the local machining carried out by the gas cluster ion beam or by the MRF (Magnetorheological Finishing) as required by amended claim 1. This argument have been fully considered and are persuasive. Therefore, the rejection of claim 1 under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al (US 2002/0179576) in view of Dyer et al (US 2002/0151255) and further in view of Ackerman (US 2002/0157421)has been withdrawn. However, upon further consideration, a new ground(s) of rejection of claim 1 is made under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al (US 2002/0179576) in view of Dyer et al (US 2002/0151255) and Ackerman (US 2002/0157421) and further in view of a newly cited reference of Kub et al (US 2004/0009649) since Kub discloses polishing the surface of a substrate subjected to etching, gas cluster ion beam for surface roughness reduction (page 5, paragraph 0050). The new ground of rejection follows

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al (US 2002/0179576) in view of Dyer et al (US 2002/0151255), and Kub et al (US 2004/0009649) and further in view of Ackerman (US 2002/0157421)

Takeuchi discloses a method for fabricating a glass substrate which is suited for photomasks/mask blank used in photolithography, the glass substrate having a flatness of 0.01 microns (not greater than 0.05 microns) (page 2, paragraph 0015), which reads on a mask blank being used in a transfer mask which is for use with EUV light since the glass substrate for an EUV mask blank required to have a flatness of 0.05 microns or less as disclosed in page 6 of the instant specification. The method comprises the steps of: measuring the height of the peak and valleys on the surface of the glass substrate (page 1, paragraph 0010), which reads on measuring a convex/concave profile of a surface of the glass substrate for a mask blank obtaining the data about the peaks and valleys on the glass substrate (page 2, paragraph 0021), which reads on specifying the degree of convexity of a convex portion present on the glass surface, plasma etching/local machining upon the substrate surface having the peaks and valleys to control the flatness of the surface of the glass substrate to 0.04 nm (not greater than 0.25 microns) (page 2, paragraph 0021), which reads on controlling a flatness of the surface of the glass substrate to a value not greater than a reference flatness required in lithography using the EUV light as the exposure light since the reference value of the flatness being 0.05 micron as disclosed in page 6 of the instant specification subsequently, subjecting the glass surface to a polishing step (page 2, paragraph 0016)

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Unlike the instant claimed invention as per claim 1, Takeuchi uses plasma etching instead of gas cluster ion beam to control the flatness of the surface of the glass substrate and Takeuchi fails to specifically disclose performing a non-contact polishing step of polishing/hydroplane polishing, after the local machining of the flatness control step, the surface of the glass substrate subjected to the local machining by the action of a machining liquid interposed between the surface of the glass substrate and a surface of a polishing tool without direct contact there between bringing the surface of the glass substrate into contact with the surface of the polishing tool, the machining liquid comprising fine powder particles of colloidal silica and an aqueous solution selected from water, an acidic aqueous solution, and an alkaline aqueous solution. Kub, in a method of bonding wafer, discloses that suitable surface reduction methods include etching, polishing, cluster ion bombardment/beam followed by a polishing operation.

Since plasma etching and cluster ion beam are both known dry etching, one skilled in the art at the time the invention was made would have found it obvious to substitute Takeuchi plasma etching step to control the flatness with gas cluster ion beam in view of Kub teaching because Kub discloses that cluster ion beam may be an alternate approach to reduce the surface roughness (page 5, paragraph 0050). In addition, one skilled in the art at the time the invention was made would also have found it obvious to substitute Takeuchi plasma etching step to control the flatness with gas cluster ion beam because a gas cluster ion beam, whose ion energy per atoms is lower than in ion etching/plasma etching, enables required ultra-precision grinding without damaging the

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workpiece surface

Dyer discloses a CMP method comprises a step of subjecting a brittle material substrate to the action of a machining liquid/polishing solution hydroplaned/interposed between the surface of the glass substrate and a surface of a polishing tool/without bringing the surface of the glass substrate into contact with the surface of the polishing tool, the machining liquid comprising fine powder particles of colloidal silica and an aqueous solution comprises of acid (page 1, paragraph 0009, page 3, paragraph 0034, 0040; page 5, paragraph 0053)

Since Takeuchi is concerned with a step of polishing glass (low-k material), ones skilled in the art at the time that the invention was made would have found it obvious to modify Takeuchi method by performing a non-contact polishing step of polishing/hydroplane polishing the surface of the glass substrate, as taught by Dyer, in order to reduce an amount of friction between the workpiece and the polishing surface thus reducing an amount of damage imparted to a low-k material on a surface of a workpiece (page 1, paragraph 0005, 0009)

Takeuchi, Kub and Dyer also fails to specifically disclose that the glass substrate being made of SiO₂-TiO₂ glass

Ackerman, in a method for producing fused silica glass ,discloses the use of SiO₂- TiO₂ glass (page 1, paragraph 0005)

One skilled in the art at the time the invention was made would have found it obvious to modify Takeuchi, Kub and Dyer method by using SiO₂-TiO₂ glass as the glass substrate in view of Ackerman teaching because in page 1, paragraph 0005, Ackerman

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discloses:

[0005] The mask structure consists of a substrate ("mask blank"), a reflective multilayer stack formed on the mask blank, and an absorber formed on the multilayer stack. Typically, the multilayer stack includes alternating layers of Mo and Si or Mo and Be. The absorber defines the pattern to be replicated on the silicon wafer. The mask blank may be made of silicon or glass or other suitable material. It is important that the mask blank has a low thermal expansion so that it does not distort under exposure to the EUV radiation. Titania-doped fused silica ($\text{SiO}_2\text{--TiO}_2$) is one example of a glass that can be made to have a very low thermal expansion, i.e., lower than pure fused silica with the potential for a coefficient of thermal expansion that approximates zero. The coefficient of thermal expansion of the $\text{SiO}_2\text{--TiO}_2$ glass can be controlled by adjusting the percent

3. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al (US 2002/0179576) in view of Dyer et al (US 2002/0151255), Ackerman ((US 2002/0157421) and Kub et al (US 2004/0009649) and further in view of Ohnuma (US 6,924,068))

Takeuchi as modified by Dyer, Ackerman and Kub has been described above. Unlike the instant claimed inventions as per claims 6-8, Takeuchi, Dyer, Ackerman and Kub fails to disclose the steps of forming a thin on the glass substrate and patterning the thin film and transferring the thin film pattern of the transfer mask onto a semiconductor substrate by lithography

Ohnuma discloses a method for fabricating a photomask comprises the step of patterning the thin film and transferring the thin film pattern of the transfer mask onto a glass substrate by lithography (col 4, lines 53-60)

Since Takeuchi is concerned with etching the glass substrate, one skilled in the art at the time the invention was made would have found it obvious to modify Takeuchi, Dyer,

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Ackerman and Kub method by patterning the thin film and transferring the thin film pattern of the transfer mask onto a glass substrate by lithography as per Ohnuma because Ohnuma discloses that resist pattern formed by photolithography is utilized as a mask for processes such as etching base film (col 1, lines 16-20)

4. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al (US 2002/0179576) in view of Dyer et al (US 2002/0151255), Ackerman (US 2002/0157421) and Kub et al (US 2004/0009649) and further in view of Ohnuma (US 6,924,068))

Takeuchi as modified by Dyer, Ackerman and Kub has been described above. Unlike the instant claimed invention as per claim 9, Takeuchi, Dyer, Ackerman and Kub fails to disclose forming a reflective multilayer on the glass substrate and forming a light absorber film on the reflective multilayer film

Ohnuma discloses a method for fabricating a photomask comprises the step of forming a reflective multilayer includes chromium on the glass substrate and forming a photoresist/light absorber film on the reflective multilayer film (col 4, lines 58-62)

One skilled in the art at the time the invention was made would have found it obvious to modify Takeuchi, Dyer, Ackerman and Kub method by forming a reflective multilayer includes chromium on the glass substrate and forming a photoresist/light absorber film on the reflective multilayer film as per Ohnuma because Ohnuma discloses that the photomask utilized in the semiconductor manufacturing process comprises of a light-blocking film/reflective film formed in the desired photoresist pattern

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5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAN VINH whose telephone number is (571)272-1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lan Vinh/
Primary Examiner, Art Unit 1792